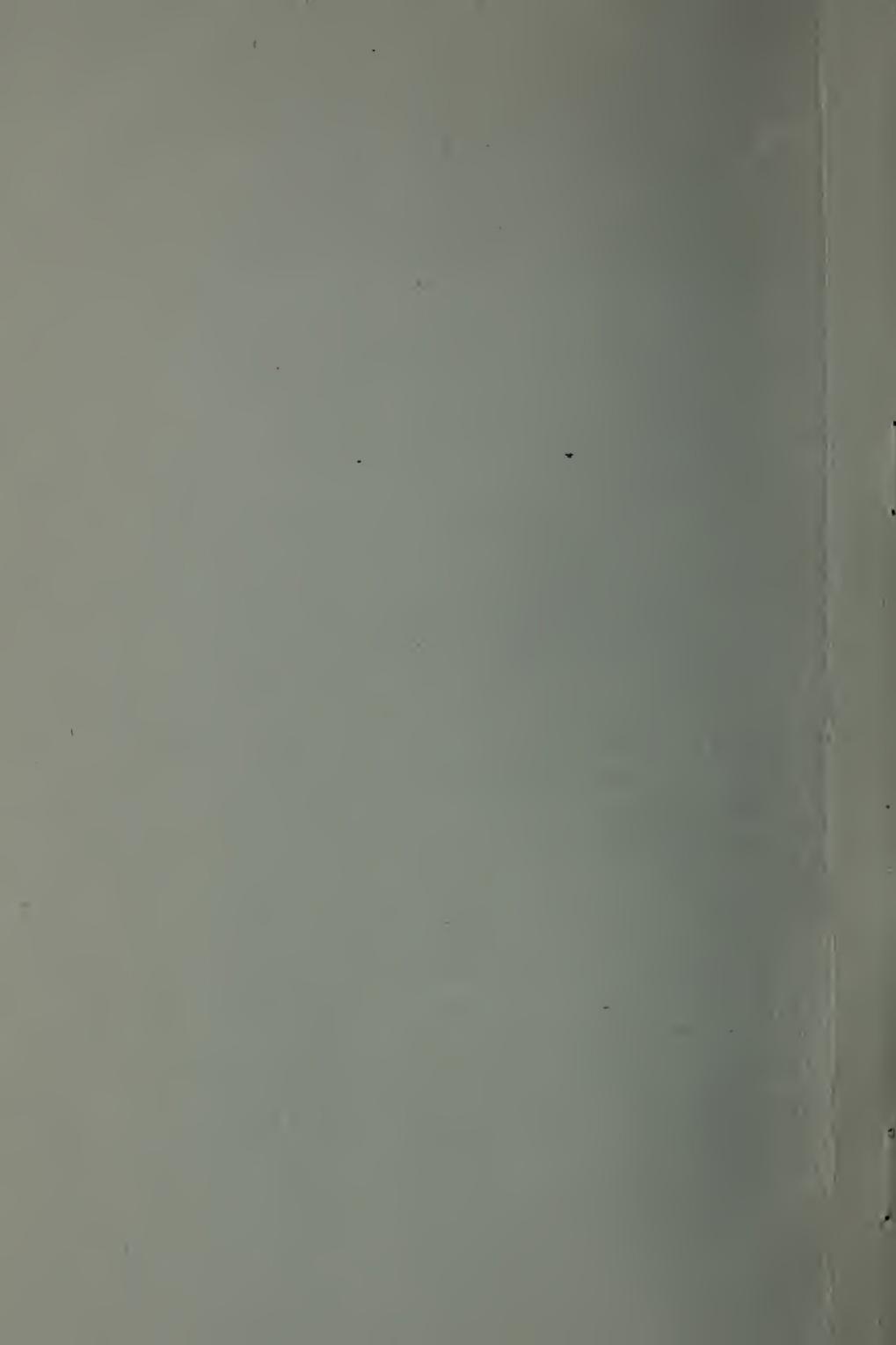


# The Time of Some Mental Processes in the Retardation and Excite- ment of Insanity

BY

SHEPHERD IVORY FRANZ

(FROM THE LABORATORY OF PATHOLOGICAL PHYSIOLOGY OF  
THE MCLEAN HOSPITAL, WAVERLEY, MASS.)



# THE TIME OF SOME MENTAL PROCESSES IN THE RETARDATION AND EXCITEMENT OF INSANITY.<sup>1</sup>

By SHEPHERD IVORY FRANZ.

(From the Laboratory of Pathological Physiology of the McLean Hospital, Waverley, Mass.)

*Introduction.* The present work was undertaken in order to gather material for the solution of the problem: to what part or parts of the nervous system may we refer the increased and the decreased psychomotor activity usually found in depressed-maniacal insanity.

The earlier psychiatrists considered as separate disease entities abnormal emotional depressions and exaltations, under the names of melancholia and mania, and the condition in which there is a more or less regular alternation of the exaltation and the depression, called circular insanity. The last state was deemed very peculiar, but until the time of Kraepelin it seemed not to have been closely associated with either of the two other conditions. To Kraepelin is due the credit for having shown that circular insanity, mania and melancholia (in its simple form) are interrelated and belong to one group which he termed *Manisch-depressive Irresein*. Hoch has well summed up the main points of the present conceptions (according to the Kraepelinian school) of the combination of mania, melancholia and the older circular insanity; a tendency to recurrence, the absence of mental deterioration, psychomotor excitability or retardation, emotional exhilaration or depression, and difficulty or (apparent) ease in thinking. These alternative symptoms may be variously combined in individual cases, the most usual, however, being the combinations of (a) exhilaration + excitability + flight of ideas and (b) depression + retardation + difficulty in thinking. In the excited phase of this condition the emotional tone is exalted. There is a feeling of *bien aise*, of expansiveness, of great ability, and of self-satisfaction. There is more or less motor excitement and a seeming rapidity of associations, with flight of ideas. The associations are usually

<sup>1</sup> By mistake of the printers the off-prints of the above article were not made and the present pamphlet is intended to give a general account of the work. The tables in the original have been omitted and the article shortened. For the full account of the work the reader is referred to the *American Journal of Psychology*, Vol. XVII, pp. 38-68, January, 1906.

superficial and sound associations. The attention is very unstable. In the depressed phase there is a lowering of emotional tone, and a feeling of *malaise*, of hopelessness, perhaps of fear, and there may be suicidal tendencies and attempts. There is often a profound motor disturbance in which the reactions—using that word in the widest sense—are slowed, and an appearance of decrease in associative ability; in other words a retardation. Any of these symptoms, but of course not opposites, may be present to a mild or to a most marked degree.

The differences in motor activity of this class of the insane have been studied to some extent, but so far as I am aware there is no published account of work such as is here attempted. At the present writing there is available only an incomplete skeleton of the work necessary for a full understanding of these motor conditions. The present article is to be considered as part of the general plan.

*Clinical Histories of the Subjects.* Six subjects were chiefly used in the research, two normal, two depressed (retarded), and two exhilarated (excited), as follows:

*Normal Subjects.* F., the writer, upon whom the whole series could not be made, was used as one normal subject.

The other normal subject, B., a business man, age 49 at the time the experiments were being made, had been a patient at the hospital for about seven years. During the course of the experiments B. was considered 'recovered,' and had been practically so for about a year. He was admitted to the hospital Oct. 22, 1897. For ten months before admission the patient had appeared not well, had become absent-minded, depressed, and later inactive. On entrance he spoke slowly, and said he worried about everything. He did not know where he was, and in the afternoon did not remember the physician whom he had seen in the morning. In four months he became a little more spontaneous, and his sentences were a little longer. For about four years he remained practically stationary, answering slowly, doing little, but when made to do things, doing them promptly and well. In June, 1903, it was noted that "There has been a slow, gradual gain which from day to day, or week to week, or even month to month, has been imperceptible, but which on looking back has amounted to a very great transformation." During the following summer the patient was occupied most of the time playing golf, tennis, etc. There was a gradual improvement, although when anything out of the ordinary arose he was inclined to hesitate a little. During the succeeding year there was a gradual recovery, and at the time of the laboratory experiments he was practically well, although disinclined to take up business. He was discharged 'recovered' May 29, 1905.

Ponder

Ponder

Ponder

Ponder

*Retarded Subjects.* Ed., a hotel clerk, age 21, was admitted to the hospital in May, 1904, greatly depressed and retarded. In March, 1904, the patient could not attend to his work, gave up his position, and was greatly worried about himself. He became slower in his movements, but in the beginning of May was restless, and once made an attempt at suicide by drowning. Then he became less active, refused food, and was untidy if not closely watched. After his entrance to the hospital he remained in bed, lying perfectly quiet, seldom moving any part of his body. He was tube-fed, and it was impossible to get him to answer any questions. Later he gave his name and age, and related part of his previous history slowly but well, but he did not know where he was, how he came to the hospital, or how long he had been there. He did not remember the physician, although he had been tube-fed by him for three weeks. His time was entirely unoccupied, and was spent walking slowly about the hall or in the yard, or sitting or lying about. The first week in June he ate well three meals, and from that time did not have to be tube-fed. Simple questions were now answered readily, but questions the answer to which required the least thought either received no response, or "I don't know." July 30th there was considerable improvement over his previous condition. Occasionally, especially towards evening, he walked about better and talked more freely to the nurses and physicians. He was at this time perfectly clear regarding his surroundings, and knew the people about him. On August 24th, when the series of experiments were begun, the patient was in the condition just described. A month later it was noted that there had been a steady improvement in his condition. He took part in games and made a fairly natural impression. He played pool and billiards well. The period of his convalescence seemed to be very short. He seemed to get well by leaps and bounds. The experiments were continued from August 24th until his discharge 'recovered' in Nov., 1904.

Ev., the other retarded subject, was at the time of the experiments 65 years old. He was a business man, and was admitted to the hospital in October, 1903. Previous to his present illness he had six attacks of depression. All of these had been rather typical, showing depression, a feeling of inadequacy, and some retardation. The present illness began in December, 1902. He began to be depressed and to sleep poorly, but kept at his business until February, 1903, when the firm failed. He was completely exhausted by the failure, and remained in bed for a week, during which time his condition was as follows: quiet, felt unable to do things, had considerable self-reproach, took little interest in things about him, complained of feeling exhausted and weak. Then he became rest-

less and agitated, and would not eat. He was sent to an insane hospital in a neighboring city. His restlessness disappeared and gave place to a retardation. On entrance to McLean Hospital he answered questions very slowly, looked depressed, obeyed commands slowly, walked hesitatingly, protruded the tongue barely beyond the lips. He showed a very typical psychomotor retardation with depression. He is senile physically but not mentally. During the next few months he gradually improved in that he took more notice of things about him, moved a little more quickly and more often. He looked after his wants better, and was a little more independent. After this primary improvement his condition remained almost stable. He sat about the ward, always unoccupied, very depressed, and never talked to any one except to answer questions. He was retarded in all ways except in the matter of eating, which he did as rapidly as any one. He was perfectly oriented and knew the people about him. There was no apparent memory defect and no thinking disorder. This patient took part in the experiments from August to December, 1904, and again in August, 1905. He was discharged to go to another hospital October, 1905, in the condition that had been characteristic of him for the past year.

*Excited Subjects.* C., age 48, a mechanic of fair education with a fourth attack of insanity, was admitted as a patient to the hospital August, 1904. The first attack (March to May, 1901) was a depression. His second attack was an excitement (Dec., 1901, to March, 1902), and the third (Dec., 1902, to May, 1903) was a depression. In this attack he was more depressed than he had been in 1901. After leaving the hospital he returned to work, but 15 months later had a second attack of excitement. He entered the hospital August, 1904. His manner was jolly, and his talk showed a flight. Evidence of his exhilaration was noted in his abnormal activity in sports, and in his other movements and talk. He was apt to become irritable at the slightest provocation. This was his condition during the course of the experiments. In July, 1905, the patient was discharged.

P., was a bright business man. At the time of his admission to the hospital, in May, 1904, he was aged 48. He was greatly excited and exhilarated, and remained under hospital care until December. A month later he returned to the hospital very depressed, after a suicidal attempt. The depression still persists. The course of his disease is a typical mania-melancholia. On entrance he was talkative, excitable, meddled with everything, expansive, euphoric, and quite convinced of his own power and excellency. There was, however, no absurdity in his expansiveness or in his general behavior. He realized that

he was excited and irritable, and knew the other patients were insane. He was oriented: Later he had a violent excitement, but returned to the milder condition in a week. At the time of the tests he was in a mildly active, exhilarated condition, and during and following the experiments he gradually became more calm and was discharged in December.

During the time of the experiments, therefore, B. and F. were normal; Ed. and Ev. were greatly depressed and retarded; and C. and P. were mildly excited and expansive. The degree of retardation in Ev. and Ed. differed but, so far as the general problem is concerned, this variation is not of great importance. C. and P. at the time of the experiments did not greatly differ in the degree of exhilaration, but if there was a difference P. was probably the more excitable. All the patients showed improvement during the course of the experiments, although the improvement in the case of Ev. was not noticeable on the ward. At no time did any of the subjects show any difficulty in thinking, and there was in none of them any appreciable memory disorder. In some cases the experiments continued for a period of 15 weeks, with intervals, but in other cases the series were not more than half that time.

*Description of experiments and results.* The following experiments were made:

- A. Rapidity of tapping.
  - B. Simple reaction time to sound.
  - C. Choice reaction time.
  - D. The time of reading.
  - E. Discrimination and marking of letters.
  - F. The time of adding.
  - G. The discrimination and distribution of colored cards.
- A. The method for determining maximum *rapidity of tapping* was as follows: A sheet of paper 8 x 10 inches was placed before the subject and he was instructed (and shown) to tap progressively in lines back and forth on the paper at his maximum speed. Thirty seconds was chosen as a convenient time in which the subject had an opportunity of warming up and of attaining his maximum speed and it seemed not sufficiently long to show any plain evidences of fatigue. The number of taps in the 30 seconds was counted and the time for making one tap was found by dividing the total time by the number of dots on the paper.

In these experiments it was found that the two excited subjects did not vary greatly from the normal, but that the retarded patients were much slower than either the normal or excited subjects. The average time of making one tap for the different subjects in the first week was B., .157 sec.; F., .154; Ed., .222; Ev., .299; C., .181 and P., .149 sec. Most of the

subjects showed improvement. This was particularly noticeable in the case of Ed. who in the eleventh week reduced his time for tapping to .162 sec. The practice effect showed by Ed. is coincident with his general mental improvement, and it is difficult to estimate how much of his increased speed was due to the recovery and how much to the practice. In similar experiments on S., another retarded subject, there was found an increased speed from practice and in his case also it is impossible to estimate the amount due to recovery and that due to practice. In the case of Ed. it was found that the speed increased after an interval in which no experiments were made and a similar effect was found with S. This would indicate that some of the improvement was due to the recovery. In a depressed case without retardation but with a feeling of inadequacy (a feeling that things are more difficult to do) there was found considerable speed in movement. This subject was as rapid as either of the two normal subjects and more rapid than C. and, of course, than Ed. and Ev.

B. The time of simple reaction to sound was determined by means of a Hipp chronoscope. The patient was instructed to hold down an electric key and to release it as soon as the sound was heard. The stimulus was produced by an electric telegraph sounder and was a clear, sharp, rather loud sound. All the subjects were right handed and only the right hand was used in these experiments. A number of tests of this character were made each day, never less than ten and often as many as 100. The results were calculated by combining the results obtained each week and the figures which are given are those of the weekly averages.

The averages for the excited patients C. and P. show no shortening in the reaction time, but on the contrary if the difference to the normal is considered sufficient to notice it is a decided slowing. Both Ed. and Ev. are slow in comparison with the results of B. and F. and also on other normal subjects. The average determination for each of the six subjects was as follows: B., .165; F., .157; Ed., .191; Ev., .299; C., .182; P., .185 sec. In results of other investigators I have found very little to compare with results of my retarded and excited subjects. In the cases which are cited (Richet, Bevan Lewis, Walitzky, v. Tschisch, Janet) few details are given which would enable us to determine whether or not retardation was present or to what extent patients were excited. In most of the experiments, however, the simple reaction of the maniacal patient was not found to be so short as that of normal people. This may be due to the fluctuation of attention which is usually found in these cases.

C. The sound apparatus used in the experiments on simple

reactions was employed in the *choice reaction* tests to give a loud sound (same intensity as in simple reaction), and for the less intense sound a telegraph key was tapped gently. The right hand reacted to the sound from the telegraph sounder as in the simple reactions and the left reacted to the sound from the telegraph key. The reactions with the right hand were used for comparison with the times of the simple reaction.

The choice reaction times obtained by other experimenters with normal, depressed and excited patients are very varied. In choice experiments similar to those made by me Tischer found the average normal choice reaction to be .316 seconds. B. and F. averaged about a quarter and a fifth of a second respectively. C. and P. averaged in their first week respectively .298 and .259, Ed. gave .268 and Ev. was distinctly slow with .432 second. The times given by B., C., Ed., and P. are shorter than those of the majority of normal subjects; but the two excited subjects, C. and P., do not show any greatly increased rapidity and in fact their last weekly averages are not so low as the lowest weekly averages in the series with Ed. The results of the experiments with S. were about the same as with Ed.

The differences between the simple and choice reaction times (*i. e.*, the choice times) are about normal in five of the subjects. In the case of Ev. on certain days the simple reaction time equalled and sometimes exceeded the choice reaction time. It is a striking fact that the choice times of the two excited subjects who were supposed to have rapid associational processes are not shorter than the normal choice time or the choice time of Ed.

Considering the reaction times as a whole, it is apparent that the excitability of the maniacal patients is not evidenced by an increase in the speed, and that the retardation is not necessarily a decrease in the speed with which a movement is initiated.

D. *The time necessary to read aloud one word* was found from a rapid reading of a page of printed matter from 360 to 400 words in length. The subjects were given the page of printing and instructed to read aloud at a maximum speed to the end of a page. The total time divided by the number of words gave the average time for reading one word.

The time taken by the six subjects was somewhat longer than that given by other investigators. The times taken by B. and F., the two normal subjects, are much longer than that taken by Cattell. P., an excited subject, took about the same time as B. and C. Ed. and Ev. were distinctly slow. As the experiments progressed the normal and the depressed subjects improved but the excited patients did not. The fastest time for each of the six observers in this experiment are as follows:

B., .249; F., .172; Ed., .342; Ev., .322; C., .329; P., .266 seconds. In this experiment Ed. is distinctly slower than Ev. It should be remarked, however, that Ev. in all probability had much greater reading ability than Ed. He was a much better educated man.

E. *Marking 100 e's.* 100 e's in a number of words with an average total of 850 letters were to be discriminated and crossed out as rapidly as possible. The subjects were not informed how many letters were to be crossed out, but only to do the work accurately and rapidly. The time for the total task was taken by a stop-watch. This total time is the sum of the time for discriminating the 850 letters and the time for marking the 100 e's. This test was very unsatisfactory owing to the two factors of variability, time and accuracy. With some subjects the accuracy did not greatly vary, and with others the time was fairly constant. So far as these results can be epitomized, we may say that the two excited subjects are not so speedy as the two normal subjects, and P. is slower than the retarded subject Ed. Ed., particularly toward the end of the series, was quite rapid. As the experiments progressed there was an increase in speed and a decrease in the number of omitted letters for all the subjects except Ev.

F. *The time of adding* was obtained from a series of twenty problems. Each problem consisted of two five-digit figures,

43678

one placed over the other, *e. g.*, 34924. I had prepared twenty-eight different sheets, each with twenty problems, and each problem differing from the others. These sheets were used in regular order for each of the subjects. The time interval between the first and second use of any particular sheet was so long that there could be no memory of the particular problem. The results of the additions were written by the subjects below the problems, and a check could then be made on the accuracy. The total time, from the start until the last figure in the sum of the twentieth problem was written, was noted. In some cases, particularly Ev. and, at first, Ed., there was considerable hesitation between the problems, and these two subjects had at first to be prodded to proceed to the next problem. There was, accordingly, considerable lost time, and this also was noted. If this lost time is subtracted from the total time we can find the actual time for the addition and the writing of the answers.

P. is the most rapid of all the subjects, probably because a large part of his business was that of bookkeeping. Ed., on the other hand, who had had considerable experience in adding in his business as hotel clerk, was noticeably retarded, particularly during the first two weeks. The total and actual

times taken by Ed. were greater at first than any other subject. In the first week B. averaged 127 seconds total and 112 seconds actual time. F. averaged 106 seconds total. Ed. averaged 312 and 279 seconds, Ev. 214 and 191 seconds, C. 183 and 161 seconds, and P. 90 and 78 seconds respectively for total and actual times.

The practice improvement was most marked in the case of Ed., a result which has been confirmed in the other experiments. Here again, however, it is difficult to determine how much the increased speed is due to the practice and how much to the recovery. Much of the "practice effect" is undoubtedly due to the improvement in the mental condition. Near the end of the series I had all the subjects count from one to one hundred and to add as rapidly as possible 100 two-digit problems. One hundred problems, *e.g.*,  $\begin{array}{r} 2 \\ + 9 \\ \hline 11 \end{array}$ ,  $\begin{array}{r} 6 \\ + 3 \\ \hline 9 \end{array}$ ,  $\begin{array}{r} 4 \\ + 8 \\ \hline 12 \end{array}$ , were placed on

a sheet of cardboard and instructions given to add the individual problems and to speak the results as rapidly as possible. After this I had each subject count at a maximum speed from 1 to 100. At the time these experiments were made Ed. was practically well. The results which were obtained were that C. was the slowest of all the subjects in the adding, his average time was 144 seconds. F. was the most rapid, 69 seconds; then P., 70; Ed., 78; B., 85; Ev., 92 seconds. In the counting F. again was most rapid. The others followed in this order: Ed., P., B., C. and Ev. Ev. took 62 seconds; C., 51. In this rather simple process Ev. was distinctly retarded although he showed little retardation in the addition of the 100 problem when compared with B. C. took considerably longer than could be expected if his maniacal state was "an easy liberation and ease in thinking." In a comparison of all the figures on addition I think we are justified in considering that a large part of the time taken by Ed. at first for the five-digit problem was due to the retardation, and that consequently much of his improvement was due to the recovery. C. showed throughout the experiments, as is indicated in the other work, a decided mental and physical clumsiness, which was not at all characteristic of any of the other subjects. It is remarkable that Ev. who was decidedly retarded should add the 100 problems much more rapidly than C., but that his retardation showed itself more when the simpler and more accustomed task of counting was set before him.

G. *Discrimination and distribution of colored cards.* The discrimination and marking of the e's proved in so many ways a difficult test to interpret that a few weeks after the beginning of the series I introduced the additional experiment of discrimination and distribution of colored cards. Ten cards, each

of a different color, were placed in a semicircle on the table in front of the subject and he was given a pack of 100 colored cards, 10 cards of each of the colors represented on the table. He was instructed to distribute the cards as rapidly as possible and to place the cards of one color in the appropriate place. The cards were so shuffled that no two cards of the same color came together in the pack. Each card was three inches square. The colors used were white, light pink, pink, red, yellow, gray green, very light green, light blue, blue, gray. There was sufficient difference in the colors to make them easily distinguished from each other, but some of the differences were sufficiently small to demand close attention to the distribution.

The results from this experiment are similar to some obtained in the other tests. Ev. was very slow, C. was slow, P. was medium in rapidity, and B., Ed., and F. were rapid, the rapidity increasing in the order named. All the subjects improved from practice.

*Conclusions.* When the results of all the experiments are considered it is evident that the excited patients do not show any consistent increase in speed over the normal or depressed patients. The maniacal condition is, therefore, not an increased motor ability but probably an increased motor diffusion.

The retarded subjects, on the other hand, were slow at the beginning of all the series, but this retardation in the time of mental processes is not regular.

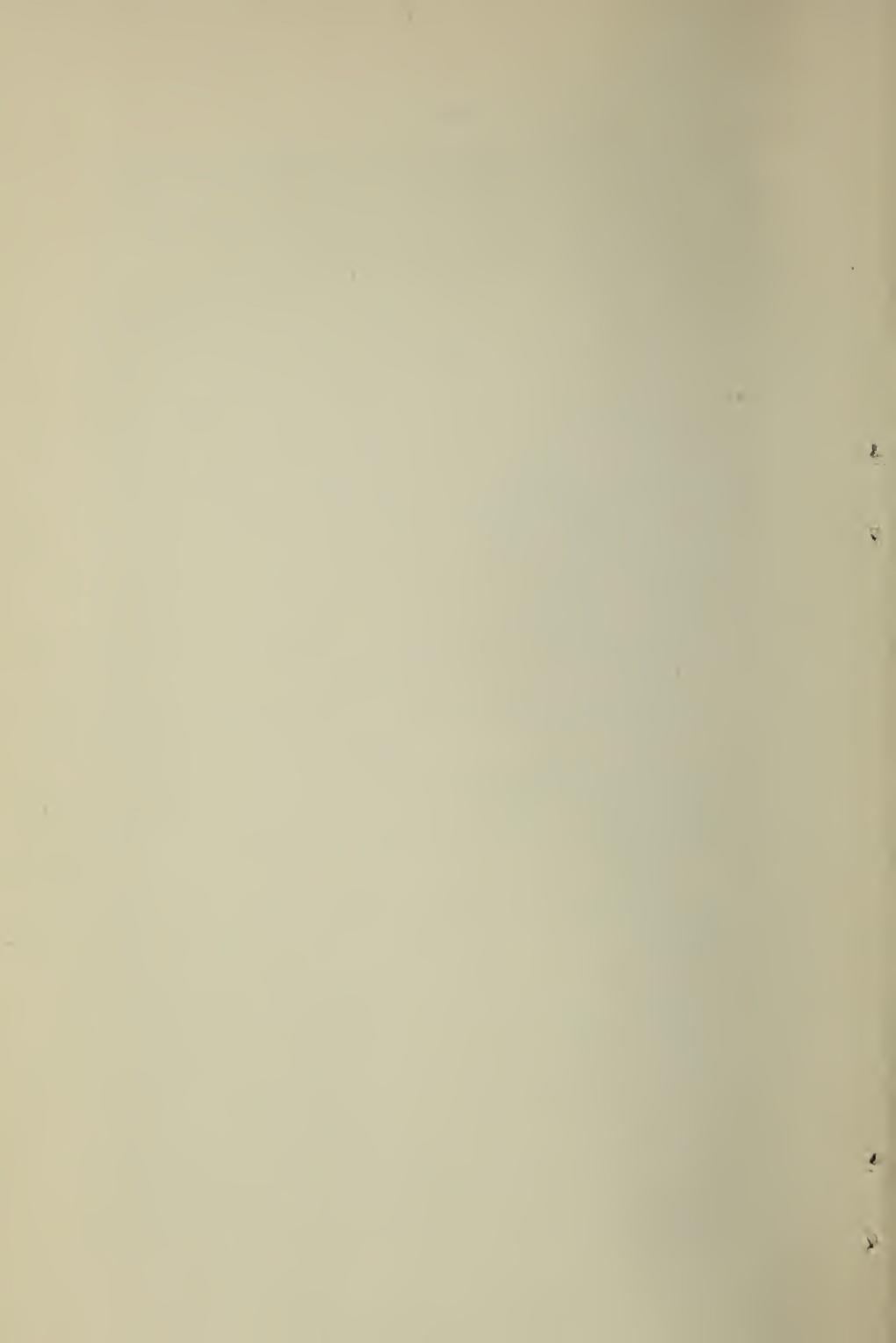
For the performance of what we may call the more complex mental processes, *e. g.*, choice reactions, adding, etc., the retarded subjects do not take proportionately so long a time as they do for simpler acts. The maniacal patients tend to keep the normal relations.

In the retarded patients considerable practice effect was found. This was more noticeable during the first few experiments. In other work I have shown that general exercise increased the speed of some mental processes in a case of retardation, and at the same time lowered the thresholds for pain and touch sensations. These facts indicate that this class of patients may be improved to some extent by systematic exercise, *i. e.*, their movements may be more rapid. This would not cure the depression but would help by lessening the retardation. In every person there is a tendency for the formation of habits, and not the least in the insane. It is probable that in many cases there is formed the habit of slowness, and this may be supplanted by an activity habit formed by exercise.

From the results of the simple reaction and the tapping experiments it seems unlikely that the retardation comes principally at the beginning of the movement, as has been suggested.

If the retardation is a slowing in starting we should expect to have a definite time added to the normal time for all psychomotor activities, and otherwise to keep the normal time relations (minus this time) for all mental processes. More detailed experiments are needed on this subject.

I have previously suggested that the retardation may be a general lowering of the irritability, but from the experiments already made it is not fully settled where the (supposed) lowered irritability is. Some experiments which I have made show that in cases of retardation the tendon reflexes are slower than normal and that the skin sensibility is dulled. In conjunction with the fact that the addition of extra mental processes does not greatly increase the total time, these facts would indicate that if there is a lowering of the irritability such lowered irritability is not principally in the brain but rather in the peripheral parts of the body, particularly the nervous system. I expect to take up this matter in more detail in another paper.







3 0112 072392779